

ENTOMOLOGY.—A recharacterization of the genus *Coelopencyrtus*, with descriptions of two new species (Hymenoptera: Encyrtidae). B. D. BURKS, Entomology Research Division, U. S. Department of Agriculture. (Communicated by C. F. W. Muesebeck.)

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In 1919 Timberlake (Proc. Hawaiian Ent. Soc. 4: 218–225) described two genera of Encyrtidae for species which are parasitic on the mature larvae of aculeate Hymenoptera in Hawaii. *Coelopencyrtus* was described for *odyneri* Timberlake and *swezeyi* Timberlake, both reared from the mature larvae of the vespid wasp *Odynerus nigripennis* (Holmgren), and *Nesencyrtus* was described for *Adelencyrtus kaalae* Ashmead, reared from the mature larvae of the colletid bee *Nesoprosopis pubescens* Perkins.

Coelopencyrtus was characterized as having the female antenna with the basal funicle segments at least as long as broad, the funicle considerably longer than the club, the club itself not greatly wider than the funicle, the mouth opening not greatly widened, the thorax elevated, and the ovipositor not exerted; the male had simple antennae and the head had the frons protuberantly produced beyond the eyes. *Nesencyrtus*, contrariwise, had the female antennal funicle with all segments broader than long, the club almost as long as the entire funicle and much broader than it, the mouth opening very broad to accommodate the unusually large mandibles, the thorax somewhat depressed, and the ovipositor slightly exerted; the male had ramose antennae and the frons was not protuberantly produced beyond the eyes.

Shortly after his 1919 paper, Timberlake described two more species of *Coelopencyrtus*. *C. orbi* (1920, Proc. Hawaiian Ent. Soc. 4: 422) was a parasite of the mature larvae of *Odynerus orbis* Perkins, and *mauiensis* (1922, *ibid.* 5: 137) like *odyneri* and *swezeyi*, was a parasite of the mature larvae of *Odynerus nigripennis* (Holmgren). He also described a second species of *Nesencyrtus*, *serramosus*, from a single un-reared male specimen (1922, *ibid.* 5: 141). All these species are Hawaiian. No additional species in either genus have been described up to now.

Recently two species of encyrtid parasites of mature larvae of the solitary colletid bee *Hylaeus* were reared and submitted to me for identification. One species had been reared in Utah and the other on Plummers Island, Md. It was apparent that these species were undescribed, but their generic assignment presented considerable difficulty. They could not be placed to genus with published keys, such as those of Ashmead (1904, Mem. Carnegie Mus. 1: 286–311), Mercet (1921, Fauna Ibérica, Himenópteros, fam. Encírtidos, pp. 60–82), Ferrière (1953, Mitt. Schweiz. Ent. Ges. 26: 1–45), or Erdős and Novicky (1955, Beitr. zur Ent. 5: 165–202). In Ashmead or Mercet they ran out near *Epiencyrtus*, but even a casual examination of these *Hylaeus* parasites showed them not to be that genus. Consequently a search was made through the numerous described encyrtid genera which are not included in the published keys. Fortunately specimens of many of these genera are in the U. S. National Museum collection. A study of these specimens and the literature finally made it clear that the *Hylaeus* parasites had a blend of the characters of Timberlake's genera *Coelopencyrtus* and *Nesencyrtus*. The males have simple, nonramose antennae, as in *Coelopencyrtus*, but the heads are nonprotuberant, as in *Nesencyrtus*. The females have the funicle segments all broader than long, the club large and wider than any funicle segments, the thorax depressed, and the ovipositor exerted, as in *Nesencyrtus*, but the mouth opening is relatively narrow, as in *Coelopencyrtus*.

Under these circumstances it seemed advisable to re-study all the species which have been placed in *Coelopencyrtus* and *Nesencyrtus*, to see how distinct they are generically. A re-examination of Timberlake's excellent descriptions and figures, along with a study of type material of *N. kaalae* and *C. odyneri*, *swezeyi*, and *orbi* in the U. S. National Museum collection, have led to

the conclusion that they all represent a single genus. The rami of the funicle segments of the male antennae are not generically significant, as these vary from six funicular rami in *sexramosus*, to four in *kaalae*, to three small rami in *mauiensis*, to one large ramus in *swezeyi*, to one very small ramus in *odyneri*, to none in *orbi*. In *orbi*, however, there is a small, ramuslike projection on the pedicel of the male antenna. Somewhat similar projections are present on the pedicels in *swezeyi* and *mauiensis*, while the pedicels are simple or only very slightly modified in *sexramosus*, *kaalae*, and *odyneri*. As for the female characters, *orbi* comes very close to bridging the separation between *Coelopencyrtus* and *Nesencyrtus*. *C. orbi* has all the funicle segments broader than long, the club is three-fourths as long as the entire funicle, the mouth opening is broader than in *odyneri*, but not so broad as in *kaalae*, the thorax is somewhat depressed, and the ovipositor is exerted, less so than in *kaalae*, but much more so than in *odyneri*. The protuberant head, so striking in the male of *odyneri*, is present in a reduced degree in the males of *orbi* and *mauiensis*.

Consideration of these facts justifies the conclusion that all the species mentioned above, as well as the two to be described below, belong in one genus, despite the striking differences that exist between some of the species. The name *Coelopencyrtus* has page priority. It may be mentioned parenthetically that the genus *Giraultella* Gahan and Fagan (= *Epaenasomyia* Girault 1919, not 1917), parasitic on the larvae of the xylocopid bee, *Xylocopa*, in Java is probably not the same as *Coelopencyrtus* although seemingly closely related. *Giraultella* is very inadequately described, and I have seen no authentic specimens. Its description was published one month after *Coelopencyrtus*.

Genus *Coelopencyrtus* Timberlake

"*Ageniaspis* sp.," Swezey, 1907, Ent. Bul. Hawaiian Sugar Planters Assoc. Expt. Sta. 5: 52.

Coelopencyrtus Timberlake, 1919, Proc. Hawaiian Ent. Soc. 4: 218; Timberlake, 1922, *ibid* 5: 135. (Type: *Coelopencyrtus odyneri* Timberlake, by original designation.)

Nesencyrtus Timberlake, 1919, Proc. Hawaiian Ent. Soc. 4: 223. (New synonymy.) (Type: *Adelencyrtus kaalae* Ashmead, by monotypy and original designation.)

Description.—Mandible with three teeth; maxillary palp with four segments, apical one the longest; labial palp with two segments, apical one the shorter; antennae inserted low on frons, near the mouth border, a relatively broad, rounded projection present between antennal bases; antennal scape enlarged, but not lamelliform; funicle with six segments, most or all of which are wider than long; club clearly 3-segmented and large, varying in length from three-quarters as long as to as long as entire funicle, and in width varying from only slightly wider than to greatly wider than broadest funicle segment; width of malar space varying from three-fifths to nine-tenths as great as maximum diameter of a compound eye; fronto-vertex broad, separated from face by a broadly rounded or subacute angle, surface faintly reticulated and lacking alveolar punctures; lateral ocelli almost touching eye margins. Thoracic notum slightly to moderately depressed, mesoscutum and scutellum shining, smooth or very minutely and faintly reticulated; axillae almost but not quite meeting on meson; scutellum without a pencil of hairs or lamelliform bristles; brachypterous or apterous forms unknown; wings long, their apices greatly exceeding gaster; submarginal vein of forewing without an apical, triangular enlargement; marginal vein as long as wide, stigmal vein arising from marginal and as long as marginal and postmarginal veins combined; marginal cilia of forewing very short and dense; legs with femora and tibiae flattened, but lateral margins not carinate; mid tibial spur as long as first mid tarsal segment. Propodeum extremely short on meson, spiracles separated from anterior propodeal margin by a space nearly equal to diameter of a spiracle; gaster slightly wider than thorax and varying from three-quarters to nine-tenths as long as thorax; tips of ovipositor sheaths hidden or slightly exerted. Male with antennal pedicel and funicle varying from simple to more or less ramose, club solid; head more or less protuberantly produced forward beyond eyes dorsally.

Members of this genus are parasites of the mature larvae of nest-building aculeate Hymenoptera. The hosts nest in wood (in twigs, abandoned beetle burrows, or in rotten logs), or in clay cells; none has been reared from ground-nesting Aculeata. The host larva becomes greatly distended and filled with cells, much like lepidopterous larvae parasitized by *Copidosoma* (see Timberlake, 1919, *loc. cit.*, p. 220).

Coelopencyrtus kaalae (Ashmead), n. comb.

Adelencyrtus kaalae Ashmead, 1901, Fauna Hawaiianensis 1, pt. 3: 323.

Nesencyrtus kaalae (Ashmead) Timberlake, 1919, Proc. Hawaiian Ent. Soc. 4: 183, 214.—Timberlake, 1922, ibid. 5: 139.

Coelopencyrtus sexramosus (Timberlake),
n. comb.

Nesencyrtus sexramosus Timberlake, 1922, Proc. Hawaiian Ent. Soc. 5: 141.

Coelopencyrtus hylaeoleter, n. sp.

Female.—Length 1.0–1.25 mm. Head and thorax dark brown to almost black, with a very faint metallic blue luster visible under strong light; antennae dark brown, with apex of pedicel tan; wings hyaline, veins dark brown, forewing with a short, faint, brown streak at base and a small brown stain below marginal vein; legs dark brown, with trochanters, tibial spurs, and basal tarsal segments tan or yellow; gaster brown, with a broad, dark brown stripe across the middle.

Mandible, Fig. 3, with dorsal tooth blunt, ventral two teeth acute. Head in anterior aspect broader than long. Antennae inserted low on frons near mouth border; scape, Fig. 2, enlarged in the middle, its maximum width one-third as great as its length; pedicel semiglobose, two-fifths as long as scape; funicle segments all wider than long, first and second segments each slightly longer than third or fourth, fifth and sixth segments longest; club broader than any funicle segment and almost as long as entire funicle. Malar space long, its width three-fifths as great as maximum diameter of compound eye. Surface of fronto-vertex minutely reticulated, mat, clothed with numerous microbristles; eyes bare. Ocelli forming a right angle; lateral ocellus very close to margin of compound eye, length of ocellular line one-half as great as diameter of lateral ocellus and one-sixth as great as length of postocellar line.

Thorax minutely reticulated dorsally, subshining, and clothed with microbristles; dorsal surface of thorax flattened, almost plane medially; pronotum narrower than mesonotum; scutellum and mesoscutum equal in length on meson. Forewing greatly exceeding apex of gaster; marginal vein thickened, Fig. 1, equal in length to postmarginal vein and three-fourths as long as stigmal vein; hairless streak narrow; marginal cilia extremely short. Basal tarsal segment of

mid and hind leg as long as tarsal segments 2 and 3 combined, basal fore tarsal segment slightly shorter than segments 2 and 3.

Propodeum extremely short on meson, posterior and anterior margins almost in contact; propodeal spiracles round, separated from anterior propodeal margin by a space slightly longer than diameter of a spiracle. Gaster slightly broader and shorter than thorax; cerci located halfway between base and apex of gaster, each cercus bearing two long and one shorter bristles; ovipositor exerted for a distance one-fifth to one-fourth the length of the gaster.

Male.—Length 1.0–1.1 mm. Color, sculpture, and pubescence as in female. Antenna with scape one-half as wide as long, pedicel one-half as long as scape and as long as combined first and second funicle segments; third and fourth funicle segments slightly shorter than first or second, fifth and sixth slightly longer; club as long as two apical funicle segments. Thorax as in female. Gaster five-sevenths as long as thorax. Aedeagus normally protruding as far as female ovipositor is exerted, apex slender and down curved.

Type locality.—Logan Canyon, Utah.

Types.—U.S.N.M. no. 63570.

Described from 9 female and 4 male specimens, as follows: Type ♀, allotype ♂, and 7 ♀ and 2 ♂ paratypes, Logan Canyon, Utah, April, 1948, reared from mature larvae of *Hylaeus* sp., G. E. Bohart; 1 ♀ and 1 ♂ paratypes, North Logan, Utah, June 4, 1952, reared from mature larvae of *Hylaeus* sp. occupying old nest of *Sceliphron* sp., G. E. Bohart and M. D. Levin. All specimens deposited in the U. S. National Museum collection. Additional, more or less fragmentary, specimens which bear the same data as above are preserved in alcohol and on slides; these specimens are not included in the type series.

Coelopencyrtus hylaeoleter agrees with *C. orbi* Timberlake in having the funicle segments of the female all wider than long, with the club large; the eyes are bare in both species, and in both *hylaeoleter* and *orbi* the ocelli form a right angle, the head is wider than long, there is a short, brown streak in the forewing along the posterior margin near the base, and the tip of the ovipositor is exerted.

C. hylaeoleter differs from *orbi* in that the antennal club of the female is almost as long as the funicle in *hylaeoleter*, while this is only three-

fourths as long in *orbi*; in *hylaeoleter* the forewing is hyaline basally, with a small, brown-shaded area beneath the marginal vein, but in *orbi* the forewing is stained brown over the entire basal half, but lacks brown shading below the marginal vein; the apex of the ovipositor in *hylaeoleter* is exerted for a distance as great as one-fifth to one-fourth the length of the gaster, while in *orbi* the ovipositor is exerted for a distance only as great as one-tenth the length of the gaster. The male of *hylaeoleter* is at once distinguished from the male of *orbi* by its simple, unmodified antennal pedicel; the pedicel in *orbi* bears a prominent, conical projection laterally.

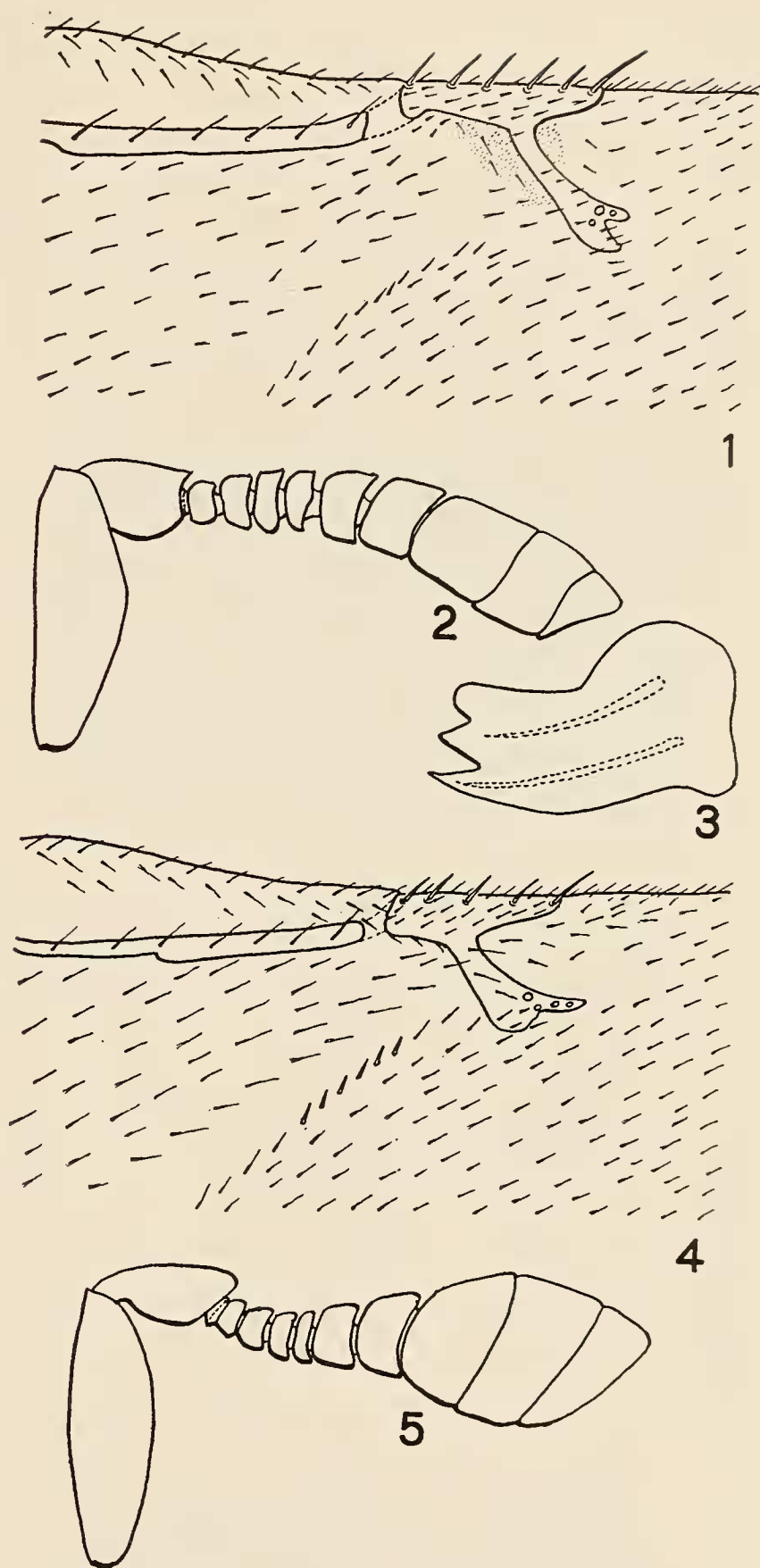
Coelopencyrtus hylaei, n. sp.

Female.—Length 1.0–1.1 mm. Head, body, and legs entirely black, with only the mid tibial spurs tan or yellow. Head with faint, metallic blue-green or dark purple luster under strong light; mesoscutum faintly metallic blue-green, scutellum nonmetallic. Wings hyaline, venation black; a very faint brown streak present along posterior margin at base of forewing; no dark shading or staining present in basal half or below marginal vein.

Head in anterior aspect slightly broader than long. Mandible as in *hylaeoleter*. Antenna, Fig. 5, very strongly clavate, third and fourth funicle segments extremely short; club as long as funicle and almost twice as wide as sixth funicle segment. Width of malar space two-thirds as great as maximum diameter of eye. Surface of fronto-vertex minutely reticulated, mat; eyes bare. Ocelli forming an angle of approximately 75° ; lateral ocellus extremely close to lateral margin of eye, length of ocellular line one-third as great as diameter of lateral ocellus and one-fifth as great as length of postocellar line.

Thorax dorsally minutely reticulated, only very faintly shining, almost mat; microbristles slightly more conspicuous than in *hylaeoleter*; thorax nor so flat dorsally as in *hylaeoleter*, the mesoscutum being more nearly arched and the scutellum only very slightly depressed on the meson; mesoscutum slightly longer than scutellum at median line. Forewing, Fig. 4, with marginal and stigmal veins relatively shorter than in *hylaeoleter* and a row of five or six microbristles in outer margin of hairless streak; legs as in *hylaeoleter*.

Gaster only very slightly wider than thorax and nine-tenths as long as it; cerci as in *hylaeoleter*.



FIGS. 1–5.—*Coelopencyrtus hylaeoleter*, n. sp., female, Fig. 1, stigmal area of forewing; Fig. 2, antenna; Fig. 3, mandible. *C. hylaei*, n. sp., female, Fig. 4, stigmal area of forewing; Fig. 5, antenna.

Tips of ovipositor sheaths exerted for a distance one-fourth as great as length of gaster.

Male.—Length 1.0 mm. Antenna with all funicle segments subequal in length; club as long as apical two funicle segments; gaster three-fourths as long as thorax; apex of aedeagus exerted and very slightly down curved.

Type locality.—Plummers Island, Md.

Types.—U.S.N.M. no. 63571.

Described from 22 ♀ and 1 ♂ specimens, as follows: Type ♀, Plummers Island, Md., taken dead from trap nest cell of *Hylaeus* sp., H-73.

August 14, 1956, K. V. Krombein; allotype ♂ and 21 ♀ paratypes, progeny of the type, taken alive from the same *Hylaeus* cell, August 17, 1956, K. V. Krombein. All specimens deposited in the U. S. National Museum collection. Mr. Krombein informed me that he first observed the original female specimen resting on the inner side of the septum of a *Hylaeus* cell in a trap nest on July 18, at which time the host egg apparently had not yet hatched. On July 20 the *Hylaeus* larva was observed to be partly grown and feeding; the chalcid still was resting on the septum. On July 27 the host larva was mature, its food had been consumed, and the chalcid

had moved to the bottom of the cell. On August 14 the chalcid was dead in the cell, and the host larva was greatly distended, its body being completely filled with cells made by the developing chalcids, which were, by this date, darkened pupae. On August 17, the chalcids had emerged and were removed from the *Hylaeus* cell. There were 25 ♀ and 1 ♂ specimens, 3 ♀ of which were mutilated in opening the cell.

C. hylaei is closely related to *hylaeoleter*, described above, but can most easily be distinguished from it by its completely black coloration. The antennae, also, are different in the two species, as is shown in Figs. 2 and 5.

STUDY OF FROGFISHES

There are fishes that fish with "fishing poles," use "worms" for bait, can swallow other fishes as large as themselves, change color like chameleons, and inflate themselves a few times their normal size. These strange representatives of the class Pisces include some of the most fantastically hideous creatures in the world. One hardly would people an imaginary malevolent planet with creatures so weird in appearance.

These fishes are sparsely scattered through most of the tropical seas. For the most part they are bottom dwellers in relatively shallow inshore waters. Some hide in seaweed. The color of some species changes in accordance with the environment, but this is not universal in the family Antennariidae, or frogfishes, described by Dr. Leonard P. Schultz, Smithsonian Institution curator of fishes, in a U. S. National Museum publication recently issued. Several hitherto unknown species, including some of the most fantastic, from the Museum's collections were described.

There are several genera of "fish fishermen," but the family Antennariidae is easily the most fantastic and colorful. Appearance and ways of life differ greatly from one species to another but they all have, in general, certain characters in common. Each has a "fish pole," of varying length, at the end of its snout. This is a bony elongation of a dorsal spine. At the end of the "pole" are one to three fleshy projections, which look like marine worms and can be made to move like worms.

The fish lies motionless on the bottom or in a mass of seaweed. Another fish comes by and

starts nibbling at the bait. The frogfish—so-called because of the general resemblance to frogs—just opens its mouth. The inflow of water sweeps the victim into the mouth. It usually happens too quickly for the eye to follow. The mouth can be greatly expanded, like that of a snake, to swallow a large victim.

The frogfish usually walks, rather than swims, Dr. Schultz says. The pectoral fins are modified to constitute legs of a sort. Movement is slow and clumsy. The frogfish way of life does not call for much agility, except with its big mouth. The ability to change color is probably more or less developed in all species of frogfishes, but in some much more than in others. This camouflage renders the creature almost completely invisible in a changing environment. Nearly every species can blow itself up either with air or water—usually with water—to a few times its normal size. This, Dr. Schultz believes, is probably a defense mechanism to terrify possible enemies.

One of the new genera described, with the name of *Kanazawaichthys* (in honor of Mr. Kanazawa of the National Museum staff) has thick bony plates on its head. Dr. Schultz believes that this is a creature of the deep open sea and that the plates serve in some way as a floating mechanism.

This family of fishes has been recognized for two centuries or more, but considerable confusion has existed among ichthyologists because of the secrecy of its ways of life. There are probably many species still unknown, says Dr. Schultz since the creatures are likely to be turned up mostly by accident.